#### F. AENT COOPERATION TREAT.

#### **PCT**

#### **NOTIFICATION OF ELECTION**

(PCT Rule 61.2)

From the I	NTFR	NATI	ONAL	BURFAL	J
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To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIOLIE

Date of mailing (day/month/year) 17 November 2000 (17.11.00)	in its capacity as elected Office
International application No. PCT/DK00/00132	Applicant's or agent's file reference P199900239WO
International filing date (day/month/year) 21 March 2000 (21.03.00)	Priority date (day/month/year) 22 March 1999 (22.03.99)
Applicant	•

	BRUUN FAMME, Per
1.	The designated Office is hereby notified of its election made:
	X in the demand filed with the International Preliminary Examining Authority on:
	19 October 2000 (19.10.00)
	in a notice effecting later election filed with the International Bureau on:
	<del></del>
2.	The election X was
	was not
	made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland

Authorized officer

R. E. Stoffel

Facsimile No.: (41-22) 740.14.35 Telephone No.: (41-22) 338.83.38

### TENT COOPERATION TREAT Y

) * ) *		From th	e iNTERN	ATIONAL BU	JREAU
PCT		To:			
NOTIFICATION OF THE RECORDING OF A CHANGE  (PCT Rule 92bis.1 and Administrative Instructions, Section 422)  Date of mailing (day/month/year) 01 October 2001 (01.10.01)		HOFMAN-BANG A/S Hans Bekkevolds Allé 7 DK-2900 Hellerup DANEMARK			
Applicant's or agent's file reference		<u> </u>			
P199900239WO			IMPOF	RTANT NOTI	FICATION
International application No.			_	e (day/month/ye	ear)
PCT/DK00/00132		21 N	larch 2000	(21.03.00)	
The following indications appeared on record X the applicant X the inventory		the agen		J	on representative
Name and Address			State of Na DK	itionality	State of Residence DK
BRUUN FAMME, Per Turkisvej 6B DK-5210 Odense NV.			Telephone	No.	
DK-5210 Odense NV. Denmark					
			Facsimile N	No.	
		•	Teleprinter	No.	
2. The International Bureau hereby notifies the a	pplicant that th	ne following	change has	been recorded	concerning:
the person the name	X the add	Г	the nati		the residence
Name and Address			State of Na	itionality	State of Residence
BRUUN FAMME, Per Hunderupyei 28			DK Telephone	No	DK
Hunderupvej 28 DK-5000 Odense C Denmark			retephone	140.	
Denmark			Facsimile I	No.	
			Teleprinter	· No	
			reseptime	140.	
3. Further observations, if necessary:			<u></u>		
4. A copy of this notification has been sent to:					
( )		Г	*ho da=	ignated Offices	concerned
X the receiving Office		Į F	=	ted Offices con	
the International Searching Authority  X the International Preliminary Examining A	Authority	[	other:	700 OHIGES 00H	00.7104
the international Frenthinary Examining A	actionty				
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland		Authorized		Athina NICKI	ITAS-ETIENNE
Facsimile No.: (41-22) 740.14.35		Telephone	No.: (41-22)	338.83.38	



**PCT** 

REC'D 0 6 JUL 2001

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

			<del></del>
Applicant's or agent's file reference P199900239WO	FOR FURTHER ACTION	See Notification of Tran Preliminary Examinatio	nsmittal of International n Report (Form PCT/IPEA/416)
International application No.	International filing date (day/monti	/year) Priority da	te (day/month/year)
PCT/DK00/00132	21/03/2000	22/03/19	
International Patent Classification (IPC) or nat G01M3/28	Lional classification and IPC		
Applicant			
APV HEAT EXCHANGER A/S			
This international preliminary examinand is transmitted to the applicant and its transmitted to the applicant and applicant and its transmitted to the applicant and appl		by this International F	reliminary Examining Authority
2. This REPORT consists of a total of	8 sheets, including this cover s	neet.	·
This report is also accompanied been amended and are the bas (see Rule 70.16 and Section 60)  These annexes consist of a total of the section 60 and 50 and	is for this report and/or sheets of the Administrative Instruction	ontaining rectifications	
IV  Lack of unity of invention V  Reasoned statement un citations and explanatio VI  Certain documents cite VII  Certain defects in the in	pinion with regard to novelty, involved to a construction of the c		
Date of submission of the demand	Date of	completion of this report 0 ½,	37. 01
Name and mailing address of the international	Authoriz	ed officer	AN HEORES MUNT
preliminary examining authority:  European Patent Office			
D-80298 Munich	Neumi	nn E	

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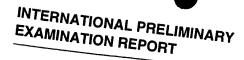
Tel. +49 89 2399 - 0 Tx: 523656 epmu d

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/DK00/00132

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	Las	13 1	_, ,		. ~,	

١.	the and	receivina Office in i		n under Article 14 are	referred to in this	s report as "originally file 16 and 70.17)):	
	1-11	1	as originally filed				
	Clai	ims, No.:					
	1-9		as received on	04/04/2001	with letter of	02/04/2001	
2.	lang	juage in which the i	<b>Juage</b> , all the elements international application available or furnished to	was filed, unless othe	erwise indicated		he
	rne	se elements were a	available of furnished to	this Additionty in the R	mowing languag	e. , willon is.	
		the language of a	translation furnished for	the purposes of the in	nternational sear	ch (under Rule 23.1(b)).	
		• • •	ublication of the internat				
		the language of a 55.2 and/or 55.3).	translation furnished for	the purposes of inter	national prelimin	ary examination (under f	Rule
3.	With inte	n regard to any <b>nuc</b> rnational preliminar	eleotide and/or amino a y examination was carr	acid sequence disclosied out on the basis of	sed in the interna f the sequence li	ational application, the sting:	
		contained in the in	ternational application i	n written form.			
		filed together with	the international applica	ation in computer read	able form.		
		furnished subsequ	ently to this Authority in	written form.			
		furnished subsequ	ently to this Authority in	computer readable fo	orm.		
		The statement that the international approximation of the statement of the	t the subsequently furni pplication as filed has b	ished written sequenc een furnished.	e listing does no	t go beyond the disclosu	re in
		The statement tha listing has been fu		ed in computer readal	ole form is identic	cal to the written sequen	ce
4.	The	amendments have	e resulted in the cancella	ation of:			
		the description,	pages:				
		the claims,	Nos.:				
		the drawings,	sheets:				
5.			en established as if (so beyond the disclosure a		its had not been	made, since they have b	een



International application No. PCT/DK00/00132

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this

- 6. Additional observations, if necessary:
- V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; 1. Statement

Yes: No:

Claims 1-9

Inventive step (IS)

Claims

Yes: Claims No:

Industrial applicability (IA)

Claims 1-9

Yes: Claims 1-9 No: Claims

- 2. Citations and explanations see separate sheet
- VI. Certain documents cited
- 1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

see separate sheet

# VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

# VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

# INTERNATIONAL PRELIMINARY **EXAMINATION REPORT - SEPARATE SHEET** International application No. PCT/DK00/00132

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents: 1.

D2: US-A-5 170 840, D3: US-A-5 759 857.

- The present application does not satisfy the criterion set forth in Article 33(3) PCT 2. because the subject matter of claims 1 to 9 does not involve an inventive step.
- The feature "in which method for leakage control the differential pressure between the primary and secondary sides is close to or identical with the differential pressures prevailing during actual operation of the heat exchanger" does not serve to distinguish claim 1 over the disclosure of D3. It is clear that the inclusion of this feature is intended to define that the method for leakage control of claim 1 of the present application is carried out as a special test procedure, and is not carried out during normal operation. However, it is noted that this additional feature merely defines that the differential pressure between the primary and secondary sides is identical to the differential pressure prevailing during actual operation: no indication is given that this refers to a special test procedure - the only restriction is that the differential pressures must be identical to those prevailing during actual operation. Since this condition is met during normal operation of the heat exchanger, claim 1 can be interpreted to mean that the method for leakage control is carried out during the actual operation cycle.
- The objections of section VIII, paragraph 1.1 should be noted. The assessment of inventive step has been carried out using the interpretation that the "clear liquid that is recycled" is in fact the product - i.e. the liquid which is passed through the product stream during normal operation of the heat exchanger is a recycled liquid.

The prior art portion of D3 describes a method of leakage control using a highly coloured dye (col. 2, lines 40-57). In particular, a method suitable for leakage

control of the internal faces that separate the primary and secondary sides of a plate heat exchanger is described (see col. 2, lines 40-45) wherein a leakage control is performed in a first step wherein a colorant-containing liquid is supplied to one of the primary and secondary sides (col. 2, line 47) while a clear liquid is supplied to the opposite side (derivable from col. 2, lines 52-53, 56-57), whereby the presence of leakages in the heat exchanger is verified by detection of the presence of the colorant in the clear liquid (see col. 2, lines 52-55). In the method for leakage control, the differential pressure between the primary and secondary sides is identical to the differential pressure prevailing during actual operation of the heat exchanger (since it is carried out during normal operating conditions - see col. 2, lines 55-57).

The type of liquid passed through the product stream of D3 depends merely on the type of product being subjected to heat exchange. In accordance with circumstances the skilled person would pass a **recycled** liquid through the heat exchanger, without the use of an inventive step.

The subject matter of claim 1 therefore lacks an inventive step.

- 2.3 As shown above, the leakage test of claim 1 may be carried out during normal operation of the heat exchanger. In this case, the subject matter of claims 4 and 5 is also known from the above-cited passage of D3. These claims 5 therefore also lack an inventive step.
- 2.4 Furthermore, D2 discloses a method of localization of leakages between the primary and secondary sides of a heat exchanger (see col. 1, lines 44-50). As noted in col. 1, lines 6-14 of D2, the "tubing" type heat exchanger referred to therein can be comprised of confronting plates. The method operates by use of a colorant (potassium permanganate) that passes through the leakages and is subsequently detected visually (see col. 2, lines 12-13) wherein a colorant-containing liquid is supplied to the one side of the heat exchanger (see col. 1, line 65 to col. 2, lines 1), and that this side is pressurised (at the pressure of the liquid) for a period of time, while the opposite side is allowed to continue to contain air (see col. 1, lines 62-64: the outer surface of the plate is cleaned and no further liquid is introduced to this volume). The location of the leakages is determined by visual inspection of the plates (see col. 2, lines 1-4).

**EXAMINATION REPORT - SEPARATE SHEET** 

The disclosure of D2 seems to imply that the visual inspection is carried out during the test procedure: the outer surface of the plate is exposed, the purple tracer is introduced at the inner surface, and the outer surface is observed to see if any seepage occurs. Claim 2 of the present application is distinguished from D2 in that the draining, disassembly and visual inspection of the plate heat exchanger is carried out only after the passage of the colorant-containing liquid.

It does not appear necessary that the inspection of D2 is carried out simultaneously with the passage of colorant-containing fluid; if a leak exists, the purple liquid will be visible on the exterior of the plate even after the test period. D2 clearly indicates that the heat exchanger may be of a plate construction (see col. 1, lines 6-14). Hence, it would appear that it is not impossible to run the test with a disassembled plate heat exchanger. However, if this should prove problematic, then there appears to be no reason why the coloured liquid cannot be passed through the assembled heat exchanger, the heat exchanger being subsequently drained and disassembled for inspection.

Whether the visual inspection occurs during or after the time period in which the coloured liquid is passed through the heat exchanger is considered to be a matter of procedural choice: no inventive step can be acknowledged in the reorganisation of the method steps such that draining, disassembly and visual inspection occur after the liquid has ben passed through.

The subject matter of claim 2 therefore also lacks an inventive step.

- No inventive step can be acknowledged in the desire to simulate operating 2.5 conditions of the heat exchanger: only in this manner can accurate leakage information be obtained. The subject matter of claim 3 is therefore also lacks an inventive step.
- 2.6 The subject matter of claims 6-8 is regarded as representing obvious choices for the skilled person, the selection of which is not regarded as comprising an inventive step.
- 3.6 Claim 9 represents a combination of claims 1 and 2. For the same reasons as given above this claim therefore also lacks an inventive step. No inventive step is

acknowledged in the combination of the two procedures which represents merely a juxtaposition of two independent processes.

#### Re Item VI Certain documents cited

Certain published documents (Rule 70.10) 1.

Publication number	Publication date	Filing date	Priority date
WO99/19706	22.04.99	08.10.98	10.10.97

#### Re Item VIII Certain observations on the international application

- The application does not meet the requirements of Article 6 PCT because claims 1. 1 and 9 are not clear in the following respects:
- 1.1 It is not clear, in the context of claim 1, what is meant by "a clear liquid that is recycled". It would appear that the intended meaning is that the clear liquid that circulates on the side opposite to the colorant-containing liquid is used specifically for the test procedure and is recirculated through the heat exchanger during the test process. It would appear from the description that the leakage testing procedure is not carried out when the heat exchanger is under normal operational conditions, but rather that the normal operation is interrupted to enable the test procedure to be carried out. The present wording of claim 1 could be interpreted to mean that the clear liquid passing through the side opposite to the side in which the colorant-containing liquid is passed is a recycled liquid. This does not exclude the possibility that the test procedure is carried out during normal operation of the heat exchanger - i.e. without interruption of the operation - and that the clear liquid is not provided merely for the test, but is one of the normal process fluids passing through the heat exchanger.

Even taking the amendments into consideration, claim 1 does not include an unambiguous definition that the method of leakage control defined therein is

International application No. PCT/DK00/00132

**EXAMINATION REPORT - SEPARATE SHEET** 

carried out as a separate testing procedure, independently of the normal operation, and that the clear liquid is provided specifically for the test procedure.

#### Re Item VII Certain defects in the international application

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art 1. disclosed in the documents D2 and D3 is not mentioned in the description, nor are these documents identified therein.

#### Claims

- 1. A method for leakage control of the internal faces that separate the primary and secondary sides of a plate 5 heat exchanger, characterised in that a containing liquid is supplied to one of the primary and secondary sides, while a clear liquid that is recycled is supplied to the opposite side, in which method leakage control the differential pressure between the primary and secondary sides is close to or identical with 10 the differential pressures prevailing during operation of the heat exchanger, whereby the presence of leakages in the plate heat exchanger is verified by detection of the presence of the colorant in the clear 1.5 liquid.
- 2. A method for localization of leakages between the primary and secondary sides of a plate heat exchanger by use of a colorant that passes through the leakages and is subsequently detected visually, characterised in that a 20 colorant-containing liquid is supplied to the one side of plate heat exchanger, this side is and that pressurised for a period of time, while the opposite side contains air, following which the plate heat exchanger is drained and disassembled, and the location the 25 is determined by visual inspection of the leakages plates.
- 3. A method according to claim 2, characterised in that the differential pressure between the primary and secondary sides is close to or identical with the differential pressures prevailing during actual operation of the plate heat exchanger.

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- 4. A method according to claim 1 or 2, characterised in that the viscosity of the colorant-containing liquid corresponds to the viscosity of the liquid that passes through the corresponding side of the plate heat exchanger in actual operation.
- 5. A method according to claim 1 or 2, characterised in that the passage of the colorant-containing liquid corresponds to the passage on the corresponding side of the plate heat exchanger in actual operation.
- 6. A method according to claim 1 or 2, characterised in that the colorant is a fluorescent substance.
- 7. A method according to claim 1 or 2, characterised in that the detection of the colorant is effected by use of UV-light.
- 8. A method according to claim 1 or 2, characterised in 20 that the colorant is a salt of fluoresceine, preferably the sodium salt uranine thereof.
- 9. A method for in situ leakage control and localisation of leakages in the internal faces that separate the primary and secondary sides of a plate heat exchanger, characterised in that a leakage control is performed in a first step wherein a colorant-containing liquid is supplied to one of the primary and secondary sides, while a clear liquid that is recycled is supplied to the opposite side, in which method for leakage control the differential pressure between the primary and secondary sides is close to or identical with the differential pressures prevailing during actual operation of the heat exchanger, whereby the presence of leakages in the plate

heat exchanger is verified by detection of the presence of the colorant in the clear liquid; and that, in a second step, the presence of leakages entails that the colorant-containing liquid on one side remains pressurised for a period of time, while the opposite side is drained to contain air, following which the plate heat exchanger is drained and disassembled, and the location of the leakages is determined by visual inspection of the plates.

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(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.						
P199900239W0	ACTION	Los E Abrillo					
International application No.	International filing date (day/month/year)	(Earliest) Priority Date (day/month/year)					
PCT/DK 00/00132	21/03/2000 22/03/1999						
Applicant							
APV HEAT EXCHANGER A/S							
AF V HEAT EXCHANGER A/3							
This International Search Report has been according to Article 18. A copy is being tra	n prepared by this International Searching Auth Insmitted to the International Bureau.	ority and is transmitted to the applicant					
This International Search Report consists  X It is also accompanied by	of a total of sheets. a copy of each prior art document cited in this	report.					
Basis of the report							
<ul> <li>a. With regard to the language, the language in which it was filed, unl</li> </ul>	international search was carried out on the bas ess otherwise indicated under this item.	is of the international application in the					
the international search w Authority (Rule 23.1(b)).	as carried out on the basis of a translation of th	ne international application furnished to this					
b. With regard to any <b>nucleotide an</b>		ternational application, the international search					
was carried out on the basis of the	e sequence listing : anal application in written form.						
	rnational application in computer readable form	n.					
furnished subsequently to	this Authority in written form.						
furnished subsequently to	this Authority in computer readble form.						
	osequently furnished written sequence listing do is filed has been furnished.	oes not go beyond the disclosure in the					
		identical to the written sequence listing has been					
2. Certain claims were fou	nd unsearchable (See Box I).	•					
3. Unity of invention is lac							
4. With regard to the title,							
X the text is approved as su	bmitted by the applicant.						
the text has been establis	hed by this Authority to read as follows:						
5. With regard to the <b>abstract</b> ,  X the text is approved as su	thmitted by the applicant						
the text has been establis	shed, according to Rule 38.2(b), by this Authorit e date of mailing of this international search rep	ry as it appears in Box III. The applicant may, ort, submit comments to this Authority.					
6. The figure of the <b>drawings</b> to be published.	ished with the abstract is Figure No.						
as suggested by the appl	icant.	X None of the figures.					
because the applicant fail	ed to suggest a figure.						
because this figure better	characterizes the invention.						

International Application No K 00/00132

a. classification of subject matter IPC 7 G01M3/28

According to International Patent Classification (IPC) or to both national classification and IPC

#### B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols) I PC  $\,7\,$  G01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 99 19706 A (APV NORTH AMERICA INC) 22 April 1999 (1999-04-22) the whole document	1,2
P,A	the whole document	3-9
X	US 4 328 700 A (FRIES BERNARD A) 11 May 1982 (1982-05-11) summary of invention, figure	1,2
Α	abstract	3-9
X	US 4 688 627 A (GERMAIN JEAN-LUC ET AL) 25 August 1987 (1987-08-25) figures, background and summary of the invention abstract	. 1,2
Α	 -/	3-9

X Further documents are listed in the continuation of box C.	Patent family members are listed in annex.
"A" document defining the general state of the art which is not considered to be of particular relevance  "E" earlier document but published on or after the international filing date  "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)  "O" document referring to an oral disclosure, use, exhibition or other means  "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention  "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone  "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combined with one or more other such documents, such combination being obvious to a person skilled in the art.  "&" document member of the same patent family
Date of the actual completion of the international search	Date of mailing of the international search report
23 May 2000	2 0. 07. 00
Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentiaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo ni, Fax: (+31-70) 340-3016	Sven-Erik Bergdahl

International Application No
PCON K 00/00132

C.(Continua	ntion) DOCUMENTS CONSIDERED TO BE RELEVANT	
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 790 345 A (MANSFIELD G ET AL) 5 February 1974 (1974-02-05) figure abstract	1
Α	abstract	2-9
X	US 5 170 840 A (GRUNWALD JAMES L) 15 December 1992 (1992-12-15) the whole document	1,6
Α	the whore document	2-5,7-9
X	US 5 759 857 A (GOYAL ET AL) 2 June 1998 (1998-06-02) figure	1
Α	abstract	2-9
X	EP 0 597 659 A (NALCO CHEMICAL CO) 18 May 1994 (1994-05-18)	1
Α	claims 	2-9

2

Information on patent family members

International Application No
PGOOD K 00/00132

	atent document d in search report	:	Publication date	Patent family member(s)	Publication date
WO	9919706	A	22-04-1999	US 6009745 A AU 9358298 A GB 2335498 A	04-01-2000 03-05-1999 22-09-1999
US	4328700	Α	11-05-1982	JP 53115287 A	07-10-1978
US	4688627	A	25-08-1987	FR 2574545 A DE 3577915 D EP 0184521 A	13-06-1986 28-06-1990 11-06-1986
US	3790345	Α	05-02-1974	DE 2137831 A ES 393711 A FR 2103757 A GB 1327096 A IT 957069 B NL 7110391 A	03-02-1972 01-06-1974 14-04-1972 15-08-1973 10-10-1973 01-02-1972
US	5170840	Α	15-12-1992	NONE	
US	5759857	Α	02-06-1998	NONE	
EP	0597659	А	18-05-1994	US 5304800 A AT 166719 T BR 9304674 A CA 2102338 A DE 69318803 D DE 69318803 T ES 2118908 T JP 6281528 A MX 9306984 A US 5416323 A	19-04-1994 15-06-1998 01-11-1994 11-05-1994 02-07-1998 22-10-1998 01-10-1998 07-10-1994 31-01-1995 16-05-1995